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IS 13568 (1992): Lead Acid Light Weight Storage Batteries for Motor Cycles and Similar Vehicles Fitted with AC Circuitry [ETD 11: Secondary Cells and Batteries]

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Indian Standard

LEAD ACID LIGHT WEIGHT STORAGE BATTERIES FOR MOTOR CYCLES AND SIMILAR VEHICLES FITTED WITH AC CIRCUITRY — SPECIFICATION

UDC 621·355·2 : 629·118·066

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

October 1992 **Price Group 3**

Secondary Cells and Batteries Sectional Committee, ETD 11

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Secondary Cells and Batteries Sectional Committee had been approved by the Electrotechnical Division Council.

This standard has been prepared keeping in view the requirements of light weight storage batteries for motor cycles and similar vehicles fitted with ac circuitry.

IS 1145 : 1980 'Specification for lead-acid storage batteries for motor cycles, auto-rickshaws and similar vehicles (*second revision*)' specifies different categories of batteries for various other vehicles.

In addition, a separate specification has been prepared to cover light weight storage batteries for motor vehicles fitted with alternators.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

AMENDMENT NO. 1 MAY 2005
TO
IS 13568 : 1992 LEAD ACID LIGHT WEIGHT STORAGE BATTERIES FOR MOTOR CYCLES AND SIMILAR VEHICLES FITTED WITH AC CIRCUITRY — SPECIFICATION

(*Page* 1, *clause* **4.6**, *line* 2) — Substitute 'IS 266 : 1993' *for* 'IS 266 : 1977'.

(*Page* 2, *clause* **4.8**, *line* 2) — Substitute 'IS 1069 : 1993' *for* 'IS 1069 : 1964'.

(*Page* 3, *Table* 1) — Add few more types under column heading **Classification** 'High performance' given on page 2.

(*Page* 4, *clauses* **7.1.2.1**, **7.2** *and* **7.8**) — Substitute 'IS 8320 : 2000' *for* 'IS 8320 : 1982'.

(*Page* 4, *clause* **7.2**) — Add the following note below the clause:

'NOTE — Digital/Analog meters may be used.'

(*Page* 4, *clause* **7.9.4**, *formula*) — Substitute 'C_t ' *for* 'C_2'.

(*Page* 5, *clause* **7.10**, *line* 3) — Substitute 'of ' *for* 'or'.

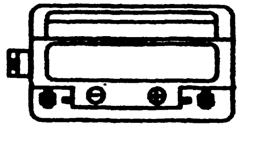
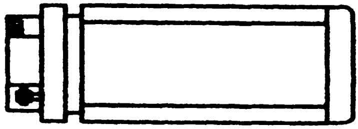
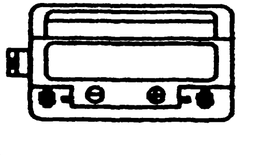
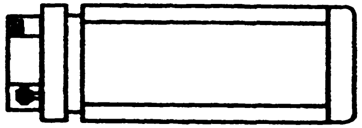
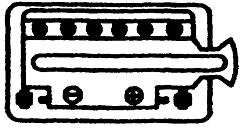
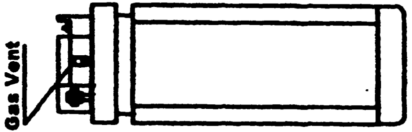
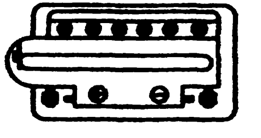
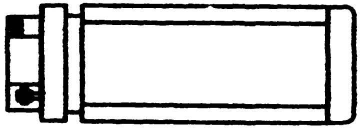
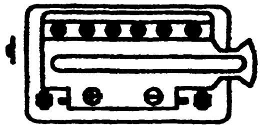
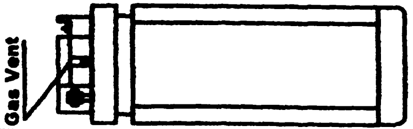
(*Page* 5, *clause* **7.11.2**, *Note*, *line* 3) — Substitute 'manufacturer' *for* 'maunfacturer'.

(*Page* 6, *clause* **7.13.4**, *line* 3) — Substitute '$I = 0.1 \times C_{10}$ A' *for* '$I=01C_{10}$'.

(*Page* 6, *Annex* A) — Substitute 'IS 266 : 1993' *for* 'IS 266 : 1977'.

(*Page* 6, *Annex* A) — Substitute 'IS 1069 : 1993' *for* 'IS 1069 : 1964'.

(*Page* 6, *Annex* A) — Substitute 'IS 8320 : 2000' *for* 'IS 8320 : 1982'.

CLASSIFICATION	TYPE	voltage	Ah Cap.@ 10 HOUR rate	MAXIMUM Dimension L X W X H	Layout of gas vent and Terminals	Position of gas vent	HRD Characteristics -10° C			Life Cycle	Approximate Weight with Electrolyte in Kg
							I Amps	5 v	V min		
High Performance	YB14L-A2	12	14	136x91x168		 Gas vent on the left side	110	9.3	1.5	300	4.8
	12N14-13A	12	14	136x91x168		 Gas vent on the left side	100	8.5	1.5	300	4.8
	YB4L-B	12	4	122X72X94			25	9.3	1.5	375	1.7
	YB7-A	12	8	137X77X135		 Gas vent on the left side	60	9.5	1.5	300	3.2
	YB9-B	12	9	137X77X141			70	9.3	1.5	350	3.6

(ETD 11)

Indian Standard

LEAD ACID LIGHT WEIGHT STORAGE BATTERIES FOR MOTOR CYCLES AND SIMILAR VEHICLES FITTED WITH AC CIRCUITRY — SPECIFICATION

1 SCOPE

1.1 This standard covers methods of tests, dimensions, ratings and performance requirements of light weight lead acid storage batteries of 6 volts and 12 volts, intended for use mainly in motorcycles and scooters including 3 wheelers, side car assemblies and autorickshaws for ignition, lighting and other auxiliary purposes. The battery may also be used as a source of power in these vehicles for starting the engine.

1.2 Batteries specifically to be used as a power source for starting the engine shall meet the requirement of high rate discharge in accordance with Table 1.

2 REFERENCES

2.1 The Indian Standards listed in Annex A are necessary adjuncts to this standard.

3 TERMINOLOGY

3.1 For the purpose of this standard, the definitions given in IS 1885 (Part 8) : 1986 in addition to the following shall apply.

3.2 Type Tests

Tests carried out to prove conformity with the requirements of standard. These are intended to prove the general quality and design of a given type of battery.

3.3 Acceptance Tests

Test carried out on samples selected from a lot for the purpose of verifying the acceptability of the lot.

3.3.1 *Lot*

All batteries of the same type, design and rating, manufactured by the same factory during the same period using the same process and materials offered for inspection at a time shall constitute a lot.

3.3.2 *Routine Tests*

Tests carried out on every battery.

4 MATERIALS AND CONSTRUCTION

4.1 Containers

The battery shall be assembled in monoblock container of suitable synthetic resin or plastic material conforming to IS 1146 : 1981.

4.2 Lids

The lids for the batteries shall be of one piece construction, that is, a single moulded lid to cover more than one cell, and shall be made of suitable synthetic resin or plastic material. The lid material shall be compatible for sealing with the container material and shall conform to IS 1146 : 1981.

4.3 Separators

The synthetic separators shall conform to IS 6071 : 1986.

4.4 Terminal

The terminal shall be made of lead alloys and the bolt and nut of M5 shall be attached for a battery of up to and inclusive of 7 AH of rated capacity and of M6 bolt and nut for a battery of more than 7 AH rated capacity. However the terminals for the batteries can also be of lead wires of colours, specific characteristics as specified by vehicle manufacturers and the battery manufacturers.

4.5 Battery Sealing

The batteries shall be sealed by means of plastic cement or similar materials. The sealing can also be effected by heating or a combination of both heating and using a suitable plastic cement or glue.

4.6 Electrolyte

The electrolyte shall be battery grade dilute sulphuric acid conforming to IS 266 : 1977.

4.7 Specific Gravity of Electrolyte

The specific gravity of the electrolyte for the purpose of tests, with the battery is in fully charged condition, corrected to 27°C shall be 1·280+/−0·010.

The specific gravity of the electrolyte in the battery while in service shall be as recommended by the battery manufacturers.

4.7.1 To correct the specific gravity reading to 27°C.

4.7.1.1 Add 0·000 7 to the observed hydrometer reading for each °C above 27°C.

4.7.1.2 Subtract 0·000 7 from the observed hydrometer reading for each °C below 27°C.

4.8 Water

The water for storage batteries shall conform to IS 1069 : 1964.

4.9 Venting

The cells may be vented into a common chamber. This chamber shall have atleast one exit vent. Separate filling plugs which need not be vented may be used to permit filling and topping up of cells to the correct level.

5 RATINGS

5.1 The voltage and capacity ratings of the battery shall be assigned by the manufacturer and shall be choosen from Table 1.

6 MARKING

6.1 The following information shall be legibly and durably marked on the outside of each battery.

6.1.1 Indicating the source of manufacture.

6.1.2 Battery type.

6.1.3 Month and year of manufacture or their observation.

6.1.4 Country of origin.

6.1.5 Acid level in case of translucent containers.

6.2 In addition to the above, the battery shall be accompanied by charging instructions which shall include the following.

6.2.1 Month and year of manufacture.

6.2.2 Last date of filling-in and charging.

6.2.3 The specific gravity of acid to be filled in.

6.2.4 The level to which the acid shall be filled in.

6.2.5 In case of dry charged battery, the date of expiry of dry charged condition with the instructons thereafter.

6.3 The batteries may also be marked with the Standard Mark.

7 TESTS

7.1 Classification of Tests

7.1.1 *Type Tests*

The tests given under **7.1.1.1** shall constitute type tests.

7.1.1.1 Sequence of tests and number of samples.

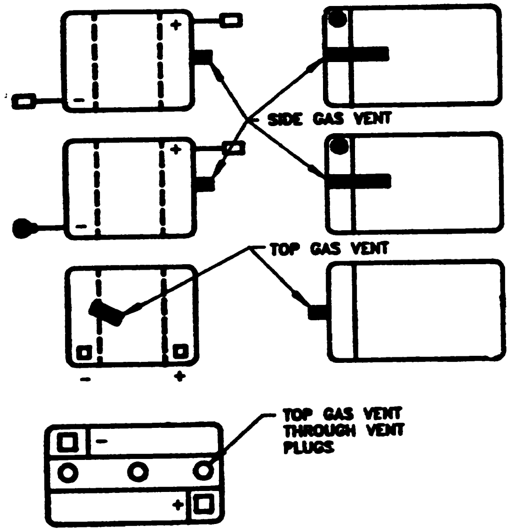
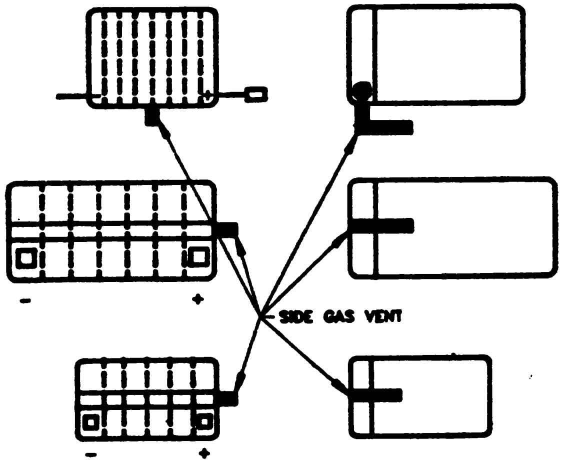
Six samples shall be drawn by the testing or inspecting authority. The sequence of tests shall be as indicated in the schedule below. A set of components representing those used in the battery shall be supplied, if required, for carrying out type tests alongwith the batteries offered for type tests:

Test	*Battery Nos.*					
	1	2	3	4	5	6
a) Physical examination	×	×	×	×	×	×
b) Checking of dimension	×	×	×	×	×	×
c) Air pressure tests	×	×	×	×	×	×
d) Test for capacity	×	×	×	×	×	×
e) High rate discharge (for cranking batteries only)	×	×	×	×	—	—
f) Test for vibration	—	—	—	—	×	—
g) Life (Reference)	×	×	—	—	—	—

NOTE — In case of dry charged batteries, the tests a, b and c followed by tests according to **7.13** shall be carried out prior to the other tests. The batteries shall be recharged at normal charge rates after the test according to **7.13**.

7.1.1.2 If any of the samples fail in the relevant type test, the testing authority may call for fresh samples not exceeding twice the original number and subject them again to the tests in which failure occurred. If there is any failure in the retests, the type shall be considered as not having passed the requirements of this standard.

Table 1

Classification	Type	Voltage	Ah Cap @ 10 Hour Rate	Maximum Dimensions L × W × H	Layout of Gas Vent and Terminals	Position of Gas Vent	HRD Characteristics — 10°C I	5′V	Y	Life Cycles	Approximate Weight with Electrolyte in kg
Normal	6N4-2A/ 6MX4-2A	6	4	71 × 71 × 96			—	—	—	375	0·85
	6N4-2A-2/ 6M×4-2A-2	6	4	71 × 71 × 96			—	—	—	375	0·85
	6N6-38/ 6M6-38	6	6	100 × 57·5 × 112			—	—	—	250	1·3
	8-38-6A/ 6M×14-6A	6	14	119 × 83 × 161			—	—	—	275	2·8
High performance	YB2·5L-C 12M×2·5L-C	12	2·5	81 × 71 × 106			10A	10·0V	90′	225	1·15
	YBSL-B/ 12M×5L-B	12	5	121 × 61 × 131			50A	9·0V	48′	200	2·1
	12N5·5/ 12M×5·5	12	5·5	104 × 91 × 115			70A (−15°C)	7·0V	24′	225	2·4

7.1.2 *Acceptance Tests*

The following shall constitute the acceptance tests:

a) Physical examination,
b) Checking of dimensions,
c) Air pressure test,
d) Capacity test, and
e) High rate discharge (for engine cranking batteries only).

NOTE — The inclusion of high rate discharge test shall be subject to agreement between the purchaser and the supplier.

In case of dry charged batteries, the above tests under d) and e) shall be carried out after the test specified under **7.13** followed by a recharge at the normal rate.

7.1.2.1 *Sampling scheme and criteria for acceptance*

The sampling scheme and the criteria for acceptance of a lot shall be in accordance with **11.1.4** of IS 8320 : 1982.

7.1.3 *Routine Tests*

The following shall constitute the routine tests:

a) Physical Examination, and
b) Air Pressure Test.

7.2 Test Equipment

The volt meters, ammeters, thermometers and hydrometers used for the tests shall comply with the requirements of **10.2** of IS 8320 : 1982.

7.3 Temperature for Tests

The temperature of electrolyte during test discharge shall be within limits of 20°C–35°C.

7.4 First (Initial) Charge

The initial charge to the battery shall be given in accordance with the manufacturer's instructions.

7.5 Test for Materials and Components

If required by the purchaser, the set of components representing those used in the battery shall be tested for conformity to various Indian Standards specified under **4.1, 4.3, 4.6** and **4.8**.

7.6 Physical Examination

The batteries shall be examined visually for conformity to the reqirements of **5** and **6**.

7.7 Dimensions

The dimensions of the batteries shall be checked in conformity with the requirements of Table 1.

7.8 Air Pressure Test

The sealing of the lid to container shall be checked by compressed air at a pressure equal to 70 cms of water in accordance with **11.6** of IS 8320 : 1982.

7.8.1 *Requirements*

The air pressure shall not fall from 70 cms to below 67 cms of water at the end of 15 seconds.

7.9 Test for Capacity

The capacity (10 hour rate) shall be tested under the conditions prescribed below.

7.9.1 *Charging of Battery*

The battery shall be charged according to manufacturer's instructions and when fully charged, the level and specific gravity of electrolyte in each cell checked and adjusted (if necessary).

7.9.2 *Discharge*

Within a period of 2 to 12 hours from the end of charge and with an electrolyte temperature of 20°C to 35°C the battery shall be discharged at a constant current of $I = 0{\cdot}1C_{10}A$ until the terminal voltage has dropped down to 5·25 V in case of 6 V battery or 10·5 V in case of 12 V battery.

7.9.3 During discharge, the following values shall be checked and noted at suitable intervals:

a) The battery terminal voltage,
b) The discharge current, and
c) The temperature of electrolyte.

7.9.4 The capacity obtained by multiplying the rate of discharge in amperes by the duration of discharge in hours shall be corrected for the temperature by the use of following formula:

$$C_{27} = \frac{C_t}{1 + 0{\cdot}01\,(t-27)}$$

where,

C_{27} = the capacity in Ah at an average temperature of 27°C.

C_t = the capacity in Ah obtained at an average electrolyte temperature of t°C, and

t = the average value in °C of the initial and final electrolyte temperature measured in the central cells.

7.9.5 After discharge, the battery shall be recharged at the normal charge rate to full charge.

7.9.6 *Requirements*

The battery shall reach 95 percent of its rated capacity in three discharges.

NOTE — If as a result of the first or second discharge itself the capacity is found to be equal to or above 95 percent of the rated value, it is not necessary to carry on the test further.

7.10 High Rate Discharge Test

After the 10 hour rate of discharge in accordance with **7.9**, the battery shall be tested at the high rate or discharge.

7.10.1 *High Rate Discharge Test at Low Temperature*

7.10.1.1 The high rate discharge capacity at low temperature is determined by a discharge at a constant current as specified in Table 1. The discharge shall be stopped when the battery terminal voltage has fallen to 3·0 V in the case of a 6·0 V battery and to 6·0 V in case of a 12·0 V battery.

7.10.1.2 For the test, the temperature of the electrolyte shall be -10 ± 1°C at the commencement of discharge.

7.10.1.3 During discharge the battery terminal voltage shall be taken at 5 to 7 seconds after the start and at 30 seconds intervals thereafter.

7.10.1.4 *Requirements*

The battery tested shall meet the minimum requirements specified in Table 1 in three discharge tests.

NOTE — If as a result of the first or second discharge itself the specified minimum requirements are met, it is not necessary to carry on the test further. However each HRD test should be preceded by a discharge at 10 hour rate as per **7.9**.

7.11 Vibration Test

The test shall be performed on a fully charged battery.

7.11.1 The samples shall be first tested for capacity test at 10 hour rate as per **7.9** before they are subjected to vibration test. During vibration, the battery shall be discharged at 0·1C10 for 2 hours.

7.11.2 The test consists in vibrating the batteries at an acceleration of vibration of 7 G (68·6 m/s^2) simple harmonic motion in up and down movements for 2 hours. The frequency of vibration is increased from 50 Hz to 500 Hz and then decreased from 500 Hz to 50 Hz continuously at a constant rate. One such sweeping cycle of changing the frequency from 50 Hz to 500 Hz and back shall be 10 minutes +/−0·5 minutes.

NOTE – If the requisite facilities are not available, an alternative test may be carried out in agreement between the maunfacturer and the user.

7.11.3 *Requirements*

There shall not be any sudden drop either in the current or voltage values. There shall be no spillage or leakage of electrolyte during the test.

7.12 Life Test

The life test is carried out on at least two batteries which have successfully passed the tests specified in **7.9** and **7.10**.

7.12.1 The test shall be carried out on a fully charged battery. The battery shall be discharged at the appropriate discharge current shown in Table 2 for one hour and consecutively charged at the appropriate current shown in Table 2 for 5 hours. This cycle of discharge and charge shall be counted as one life test cycle.

7.12.2 The temperature for the test shall be between 40°C and 45°C.

7.12.3 At approximately every 25 cycles, the discharge shall be continued till the battery terminal voltage drops down to 1·7 V per cell on an average that is 5.1 V for a 6·0 V battery and 10·2 V for a 12·0 V battery and the duration is noted. The charging of the battery is carried out at appropriate charging current as given in Table 2, until the terminal voltages measured consecutively 3 times at intervals of hour shows a constant value. At the end of the charge the acid level and specific gravity shall be adjusted to ‘upper line’ and to 1·280 (corrected to 27°C) respectively.

7.12.4 The test shall be discontinued when the capacity obtained as product of discharge current and the discharge duration as per **7.12.3** above, drops down to 40 percent or less of the 10 hour rated capacity as given in Table 1.

Table 2

(*Clauses* 7.12 *and* 7.12.7)

Capacity of Battery at 10 Hour Rate	2 Ah to 5 Ah (excl)	5 Ah to 10 Ah (excl)	10 Ah to 20 Ah (excl)
Discharge current A	1·2	2·5	5·0
Charge current A	0·25	0·63	1·25

7.12.5 The exact number of cycles of life test shall be computed from the curve obtained by plotting the number of life test cycles and the capacity.

The number of capacity (10 hour) discharges and high rate discharges done as per **7.9** and **7.10** as also the capacity discharges during the life test shall be added to the life test cycles.

7.12.6 When the engine cranking capability is to be tested, the high rate discharge test as per **7.10** shall be carried out at approximately 50 cycle of discharge and charge, 125 cycle and every 75 cycle thereafter instead of the test specified in **7.12.3** above. In this case the charging shall be done after each High Rate Discharge test at a current of 2·5 A per 100 A discharge current and for a duration of 1 hour per discharge duration of 1 minute.

7.12.7 In the event of discontinuity of test occurring, the test shall be recommended after charging the battery at specified charging currents as per Table 2 for 1 hour per 24 hours of discontinuity.

7.12.8 *Requirements*

The battery shall last the specified number of life test cycles as given in Table 1.

NOTE — The life test is only a reference test and the results of the test shall not be considered for type approval purposes.

7.13 Test for Dry Charged Battery

7.13.1 The battery shall be tested within 60 days of the manufacture.

7.13.2 The battery shall be maintained at a temperature of 27+/−2°C for 24 hour prior to test.

7.13.3 The battery shall then be filled with electrolyte of specific gravity 1·280 ± 0·010. The temperasure of the electrolyte before filling shall be 27+/−2°C.

7.13.4 Twenty minutes after the completion of filling, the battery shall be discharged at a constant current $I=01C_{10}A$ until the terminal voltage has fallen to 5·25V in case of 6V battery and 10·50V in case of 12V battery. The readings during discharge and the calculation of capacity shall be noted as in **7.9.3** and **7.94**.

7.13.5 *Requirements*

The battery shall give not less than 76 percent of its rated capacity.

ANNEX A

(*Clause* 2.1)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
266 : 1977	Sulphuric acid (*second revision*)
1069 : 1964	Water for storage batteries (*revised*)
1146 : 1981	Rubber and plastic containers for lead-acid storage batteries (*second revision*)
1885 (Part 8) : 1986	Electrotechnical vocabulary : Secondary cells and batteries (*first revision*)
6071 : 1986	Synthetic separators for lead-acid batteries (*first revision*)
8320 : 1982	General requirements and methods of test for lead-acid storage batteries (*first revision*)

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Southern : C. I. T. Campus, IV Cross Road, MADRAS 600113	235 02 16, 235 04 42, 235 15 19, 235 23 15
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